

IN THE CLAIMS:

1 1. (Currently Amended) An integrated optics encryption device comprising:
2 ~~a coherent light source connected to a wave guide having an input and an output~~
3 ~~with and~~ a contractable refractive index; ~~the wave guide comprising a message signal input and a~~
4 ~~key signal input~~
5 a coherent light source connected to the input of the wave guide;
6 a message signed source connected to the wave guide for controlling the
7 refractive index; and
8 a key signal source connected to the wave guide for controlling the refractive
9 index;
10 whereby an encrypted message appears at the output of the wave guide based on a
11 message signal input and key signal input.

1 2. (Original) The integrated optics encryption device of Claim 1 where the wave
2 guide produces "exclusive or" functionality based on the message signal input and the key signal
3 input.

1 3. (Original) The integrated optics encryption device of Claim 1 where the coherent
2 light source is a laser diode.

1 4. (Original) The integrated optics encryption device of Claim 1 where the wave
2 guide further comprises an encrypted message signal output.

1 5. (Currently Amended) An integrated optics encryption device comprising:
2 a coherent light source connected to a multi-functional integrated optics chip
3 having an input, an output, a message signal input, and a key signal input, and
4 said multi functional integrated optics chip comprising a message signal input
5 and a key signal input a coherent light source connected to the input of the integrated optics chip.

1 6. (Original) The integrated optics encryption device of Claim 5 where the multi-
2 functional integrated optics chip comprises at least two divergent paths, each path comprising an
3 end.

1 7. (Original) The integrated optics encryption device of Claim 6 further comprising
2 a loop connected to the multi-functional integrated optics chip at the end of each path.

1 8. (Original) The integrated optics encryption device of Claim 6 wherein each end
2 is mirrored.

1 9. (Original) The integrated optics encryption device of Claim 5 where the multi-
2 functional integrated optics chip comprises two divergent paths meeting at a convergent end.

1 10. (Original) The integrated optics encryption device of Claim 5 where at least one
2 signal generating means is connected to the message signal input and at least one signal
3 generating means is connected to the key signal input.

1 11. (Original) The integrated optics encryption device of Claim 5 where the multi-
2 functional integrated optics chip further comprises an encrypted message output.

1 12. (Original) The integrated optics encryption device of Claim 6 where the message
2 signal input is connected to one path and can reversibly alter the refractive index of the path to
3 which it is connected and the key signal input is connected to one path and can reversibly alter
4 the refractive index of the path to which it is connected.

1 13. (Currently Amended) An integrated optics encryption device comprising:

2 ~~a coherent light source connected to~~

3 a multi-functional integrated optics chip, ~~comprising having an input, an output, a~~
4 message signal input, a key signal input, and two divergent paths with mirrored ends, ~~and an~~
5 ~~encrypted message output;~~

6 ~~at least one a~~ signal generating means connected to the message signal input;
7 ~~and at least one a~~ signal generating means connected to the key signal input; and
8 a coherent light source connected to the input of the multi-functional integrated
9 optics chip;

10 whereby an encrypted message appears at the output based on the message signal
11 input and key signal input.

1 14. (Original) The integrated optics encryption device of Claim 13 where the
2 message signal input is connected to one path and can reversibly alter the refractive index of the
3 path to which it is connected and the key signal input is connected to the other path and can
4 reversibly alter the refractive index of the path to which it is connected.

1 15. (Original) The integrated optics encryption device of Claim 13 where at least one
2 signal generating means connected to the key signal input is a random number generator.

1 16. (Original) The integrated optics encryption device of Claim 13 where the
2 coherent light source is a laser.

1 17. (Original) The integrated optics encryption device of Claim 13 where the
2 coherent light source is a laser diode.

1 18. (Currently Amended) An integrated optics encryption device comprising: ~~means~~
2 ~~for generating a coherent light signal connected to~~
3 a multi-functional integrated optics chip ~~comprising~~ having an input, a message
4 signal input, a key signal input, and an encrypted message output, ~~and~~
5 means for generating a coherent light signal connected to the input of the optics
6 chip; and
7 means for producing "exclusive or" functionality based on the message signal
8 input and the key signal input.

1 19. (Original) The integrated optics encryption device of Claim 18 further
2 comprising at least one signal generating means connected to the message signal input and at
3 least one signal generating means connected to the key signal input and where the means for
4 producing "exclusive or" functionality based on the message signal input and the key signal input
5 comprises means for dividing the coherent light signal into two divergent paths with mirrored
6 ends and means for altering a refractive index of the paths.

1 20. (Original) The integrated optics encryption device of Claim 18 wherein the
2 message signal input further comprises means for reversibly altering a refractive index of one

3 path and wherein the key signal input further comprises means for reversibly altering a refractive
4 index of another path.

1 21. (Original) The integrated optics encryption device of Claim 19 wherein at least
2 one signal generating means connected to the key signal input is a random number generator.

1 22. (Original) A method for encryption using interference from a coherent light
2 source comprising the steps of:

3 issuing a coherent light signal from a coherent light source to a multi-functional
4 integrated optics chip;

5 dividing the coherent light signal into two paths within the multi-functional
6 integrated optics chip;

7 issuing pre-determined signals to the two paths of the multi-functional integrated
8 optic chip where a message signal input is attached to one path of the multi-functional integrated
9 optics chip and a key signal input is attached to the other path;

10 recombining the divided light signal to create an encrypted signal; and,
11 outputting the encrypted signal via an encrypted message output.

1 23. (Original) The method of claim 22 where the message signal input and key signal
2 input reversibly alter the refractive index of the path to which each input is connected.

1 24. (Original) The method of Claim 22 where the key signal input is connected to a
2 random number generator.

1 25. (Original) The method of Claim 22 where each path has a mirrored end.

1 26. (Original) A method for decryption using interference from a coherent light
2 source comprising the steps of:
3 issuing a coherent light signal from a coherent light source to a multi-functional
4 integrated optics chip;
5 dividing the coherent light signal into two paths within the multi-functional
6 integrated optics chip;
7 issuing pre-determined signals to the two paths of the multi-functional integrated
8 optic chip where an encrypted message signal input is attached to one path of the multi-
9 functional integrated optics chip and a key signal input is attached to the other path;
10 recombining the divided light signal to create a message signal; and,
11 outputting the message signal via a message signal output.